

GEOLOGY/GEOMORPHOLOGY

Physiographic Region/Geology/Soils

The Chariton River basin is within the Glaciated Plains region of Missouri and Iowa (Unklesbay and Vineyard 1992), also known as the Dissected Till Plains (COE 1963, Figure 2). In describing the geological origins of the basin, we start at the bottom of a stratum that exists 350 to 600 feet into the earth. Up to 250 feet of limestone was deposited in the Mississippian age (MDNR unpublished). Above the limestone are deposits of Pennsylvanian-age sedimentary rock in layers up to 170 feet thick. These were formed under rapidly changing conditions that caused sediments to be deposited in alternating sequences (e.g., shale, coal, limestone etc., Figure 3) (Unklesbay and Vineyard 1992).

The basin contains coal deposits of the Pennsylvanian age (MDNR unpublished), yet not all of it has commercial value. Of the five minable coal fields in Missouri, two lie partially within the boundaries of the Chariton River basin (Unklesbay and Vineyard 1992). The "Plains" of the Glaciated Plains are the deposits that were left on top of the Pennsylvanian strata by glaciers--a level expanse of till or drift up to 200 feet deep composed of mostly clay with rock fragments and sand lenses (MDNR unpublished). Erosional forces cut steep relief into this landscape prior to it being covered by wind deposited loess (Unklesbay and Vinyard 1992), which varies in thickness to eight feet. Soils of loessal origin are found primarily on the tops of ridges (SCS 1995, 1994, 1991, 1989).

The prevalent soil types that developed from this loess and till parent material are classified as loams with differing clay and silt content. Soils with silt content are predominantly alluvial in origin. The relatively low permeability of the soil and till coupled with the presence of shale and coal greatly inhibits the percolation of surface water to ground water sources. Because of this, most water movement occurs through the stream network.

Of the mappable soil units in Putnam, Adair and Macon counties, 57% to 71% were classified as "eroded" or "severely eroded" (SCS 1995, 1994, 1991). The streams of the basin have served as depositories for these eroded soils. The bed of the Chariton River mainstem is comprised almost exclusively of unconsolidated sand.

Though the stream resource remains very degraded, soil erosion has been reduced significantly in the past ten years. In a 1982 report it was noted that 56% of land in the Chariton River basin was losing 8, 15 or 22 tons of soil per acre annually depending upon soil type (USDA 1982). An inventory by the Soil Conservation Service revealed that mean soil loss rate per acre of Missouri farmland dropped from 9.4 tons in 1982 to 5.5 tons in 1992 (SCS 1995). Ninety percent of the reduction occurred on cropland. Breaking this figure down, 47% was attributable to implementation of conservation practices on highly erodible cropland, 35% was due to cropland going into the Conservation Reserve Program (CRP), 10% was attributable to soil loss reductions on lands not classified as highly erodible, and 9% was attributed to other sources. In a watershed where the majority of land is in some type of commodity production, wise land management is

crucial to the quality of stream habitat and health of the aquatic communities they support.

Stream Channel Gradients

Channel gradients (slopes) were determined for all third-order and larger streams by using USGS 7.5-minute topographic maps and digitizing software (Appendix A). Gradient is very low (2.2-3.1 feet/mile) in the mainstem Chariton River; and it is equally low (1.0-3.3 feet/mile) in the lowermost reaches (orders 4-5) of major basin tributaries – Middle Fork Little Chariton River, East Fork Little Chariton River, and Mussel Fork Creek. Gradients in fourth-order reaches of other basin streams range from 1.4 to 10.4 feet/mile. Such low gradients lend themselves to deposition of sediments transported from the watershed.

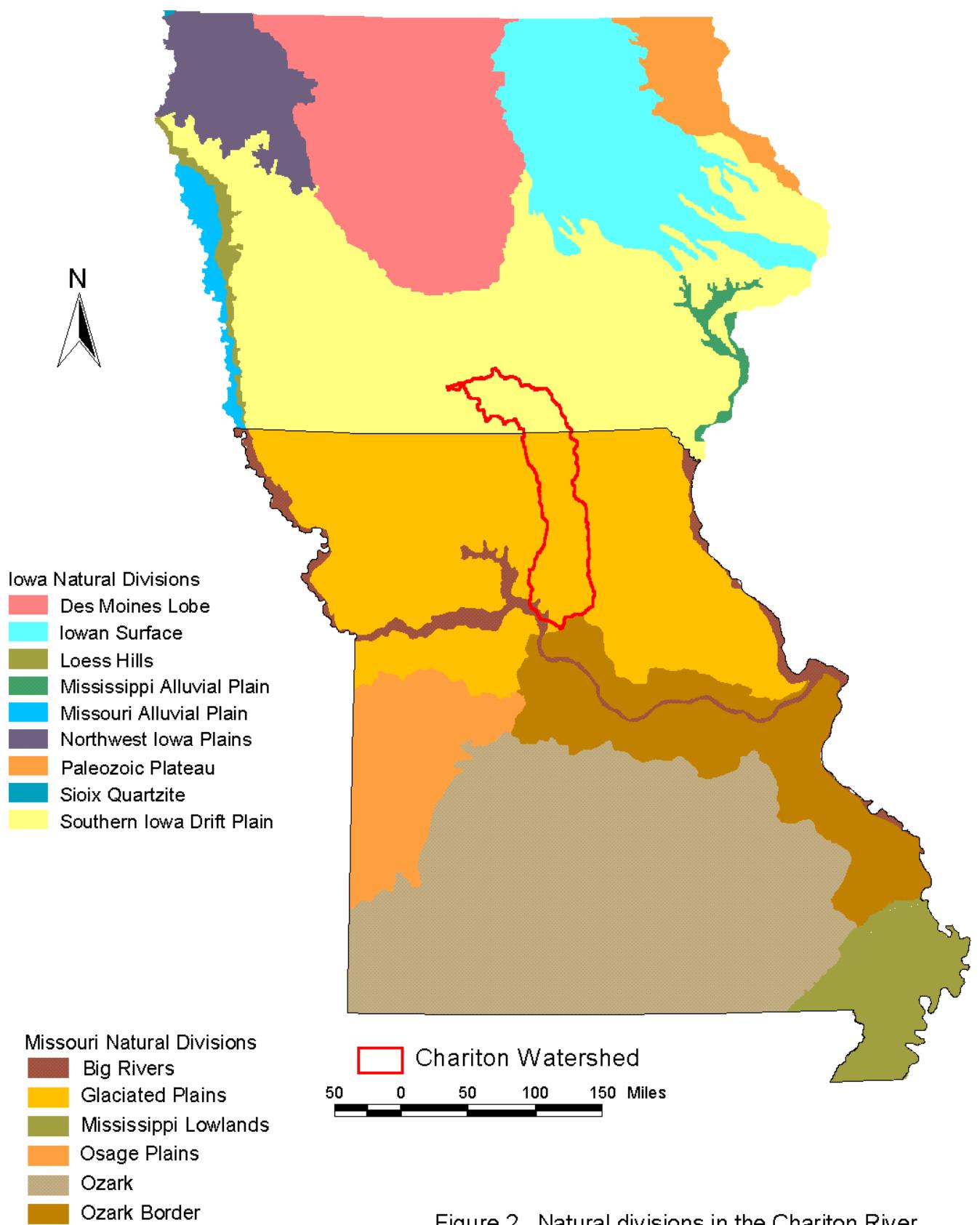


Figure 2. Natural divisions in the Chariton River watershed, in Missouri and Iowa.

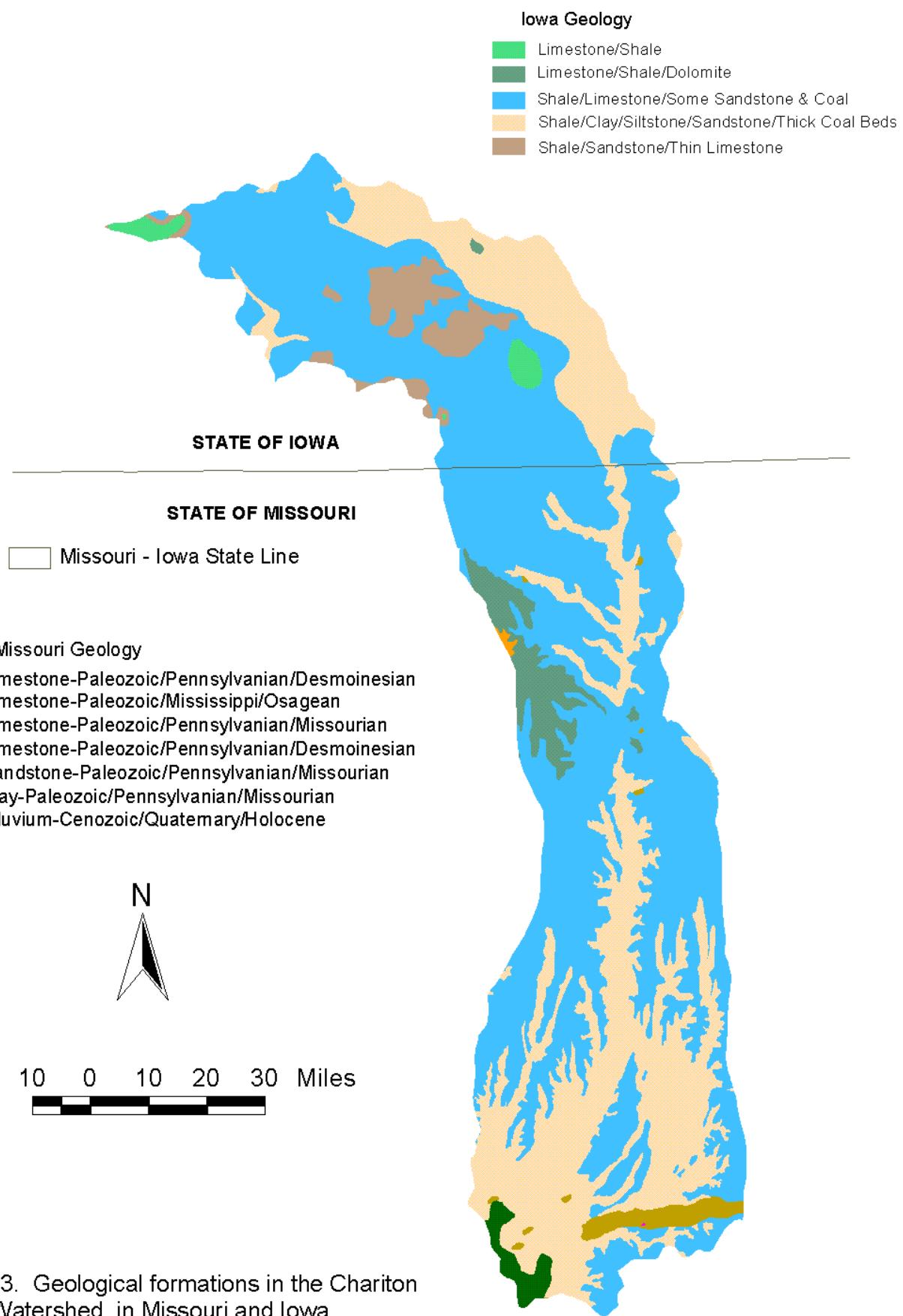


Figure 3. Geological formations in the Chariton River Watershed, in Missouri and Iowa

Appendix A1 and A2: General location, mileage, and habitat information for all third order and larger streams within the Chariton River basin. The legal description is of the mouth of each respective stream. All mileages and gradients were determined from measurements on 1:24,000 topographic maps by using a Houston Instrument digitizer. The first gradient figure presented is a mean for the entire stream from its uppermost third order point to its mouth. The gradient of reaches of different orders are denoted by a superscripted number; the superscript refers to the stream order. "NM" = not measurable. "Chan" = channelized. "% Perm Flow" = percent of stream channel length represented by a solid blue line on 1:24,000 topographic maps.

Appendix A1 – Stream Mileage and Habitat Information

Stream Code	Stream Name	County	Order	Miles Total	Miles Chan	% Chan	% Perm Flow
LITTLE CHARITON RIVER SUBBASIN							
80000000	Old Channel Chariton	Chariton	3	19.4	0	0	100
51110000	Young Creek	Chariton	3	1.9	0	0	0
46580000	Little Chariton River	Chariton	6	7.1	2.9	40	100
46581100	Doxies Creek	Chariton	4	12.7	3.8	30	100
46581110	Batts Creek	Chariton	4	5.8	1.9	33	100
*46581111	Unnamed	Chariton	3	.2	.2	100	0
*46581112	North Fork Batts Creek	Chariton	3	2.5	.4	16	100
46581120	Doxies Fork	Howard	3	1.3	0	0	100
46581200	Unnamed	Chariton	3	1.1	0	0	0
46582000	Middle Fork Little Chariton	Chariton	5	63.1	31.3	50	100
46582120	Lake Branch	Chariton	3	.8	.3	38	0
46582130	Muncas Creek	Chariton	3	4.3	1.5	35	100
46582140	Bee Creek	Chariton	3	1.3	.3	23	100
46582150	Unnamed	Randolph	3	1.2	0	0	0
*46582210	Unnamed (Brush Creek Tributary)	Randolph	3	.2	0	0	0
46582230	North Fork Claybank Creek	Macon	4	6.7	2.2	33	100
*46582231	Tributary of North Fork Claybank Creek	Macon	3	.2	0	0	0
*46582300	Stinking Creek	Macon	3	7	4.6	66	100
46582410	Unnamed	Macon	3	.2	0	0	0
46582420	Sweezer Creek	Macon	3	6.4	1.6	25	100
46582430	Town Creek	Macon	3	.2	0	0	100
*46582440	Unnamed	Macon	3	2	0	0	100

Appendix A1 continued

46583000	East Fork Little Chariton River	Chariton	5	99.8	23.5	24	100
99999991	Unnamed	Chariton	3	6.8	0	0	0
46583110	Barber Branch	Howard	3	2.3	0	0	89
46583120	Mott Creek	Chariton	4	2.2	.3	14	0
*46583121	Tributary of Mott Creek	Chariton	3	.3	0	0	0
46583130	Silver Creek	Chariton	4	17.4	4	25	100
*46583131	Tributary of Silver Creek	Randolph	3	2.3	.3	13	0
*46583132	Bagby Branch	Randolph	3	2	0	0	100
*46583133	Turner Fork	Randolph	3	4.4	0	0	100
99999992	Unnamed	Randolph	3	.4	.4	100	100
46583140	Sweet Spring Creek	Randolph	4	17.4	3.7	25	100
*46583141	Tributary of Sweet Springs	Randolph	3	9.2	0	0	0
*46583142	Collier Branch	Randolph	3	1.2	0	0	100
*46583143	Trib. of Sweet Springs	Randolph	3	1.3	.3	23	100
*46583144	Trib. of Sweet Springs	Randolph	3	.9	0	0	0
46583150	Dark Creek	Randolph	3	10.9	4.7	43	100
46583160	Sugar Creek	Randolph	4	7.3	2.3	32	100
*46583161	Tributary of Sugar Creek	Randolph	3	1.2	0	0	0
46583170	Sinking Creek	Randolph	3	3	1.3	43	100
46583210	Walnut Creek	Randolph	4	3.1	2	65	100
*46583211	East Fork Walnut	Randolph	3	3.4	0	0	100
*46583212	North Fork Walnut	Randolph	3	.6	.2	33	100
99999993	Unnamed	Randolph	3	.99	0	0	0
46583220	Unnamed	Randolph	3	2.6	1.4	54	0
46583230	Unnamed	Macon	3	1.2	0	0	0
46583240	Unnamed	Macon	3	.9	.4	44	100
46583250	Duck Creek	Macon	3	1.8	0	0	0
46583260	Long Branch	Macon	4	27.5	11.7	43	100
*46583261	Tributary to Long Branch	Adair	3	.9	0	0	0
46583270	Lick Creek	Macon	3	2.8	0	0	100
46583280	Richland Creek	Macon	3	7.2	0	0	100

Appendix A1 continued

46583290	Tributary of East Fork Little Chariton	Adair	3	.2	0	0	0
MUSSEL FORK SUBBASIN							
51130000	Mussel Fork Creek	Chariton	5	100.3	24.3	24	100
51131100	Unnamed	Chariton	3	1.3	1.3	100	0
51131200	Unnamed	Chariton	3	.6	.6	100	0
51131300	Long Branch	Chariton	4	11.6	4.9	43	100
51131310	Unnamed	Chariton	3	1	0	0	100
51131320	Skunk Creek	Chariton	3	1.3	.2	17	100
51131330	Hurricane Creek	Chariton	3	.7	.7	100	100
51131400	Cottonwood Creek	Chariton	3	7.3	3.6	49	76
51131500	Clarks Creek	Chariton	4	11.4	6.9	60	100
51131510	Unnamed	Chariton	3	.2	.2	100	0
51131520	Locust Branch	Chariton	3	4.2	3.7	89	100
51131600	Unnamed	Chariton	3	.4	0	0	0
51131700	Van Dorsen	Chariton	3	.1	0	0	100
51131800	Unnamed	Chariton	3	.6	.6	100	0
51132100	Brush Creek	Chariton	3	17.1	11.3	66	100
51132400	Unnamed	Macon	3	2.7	0	0	0
51132500	Badger Creek	Macon	3	2.4	0	0	100
51132600	Little Mussel	Adair	3	2.7	.4	16	100
51132700	Unnamed	Sullivan	3	.7	.6	82	0
51132800	Unnamed	Sullivan	3	2.9	.3	11	0
CHARITON RIVER MAIN STEM SUBBASIN							
51200000	Chariton River	Chariton	6	208.6	114.1	55	100
51200001	Unnamed	Chariton	3	1.5	.5	33	0
51200002	Unnamed	Chariton	3	3.0	3.0	100	0
51200003	Unnamed	Chariton	3	2.5	2.5	100	100
51210000	Puzzle Creek	Chariton	4	5.2	4.4	85	100
51211000	Unnamed	Chariton	3	1.1	.6	52	0
51220000	Long Creek	Chariton	3	6.0	2.5	41	0
51230000	Jones Branch	Chariton	4	10.6	5.3	43	100
51231000	Unnamed	Chariton	3	1.2	0	0	0
51240000	Bee Branch	Chariton	4	13.2	7.5	56	100
51241000	Unnamed	Chariton	3	1.0	.6	54	0

Appendix A1 continued

51242000	East Bee Branch	Chariton	3	8.6	3.9	45	100
51270000	Elm Branch	Chariton	3	1.6	1.6	100	100
51280000	Kelly Branch	Chariton	3	11.0	1.9	17	100
51300004	Old Channel Chariton River	Macon	4	13.5	1.9	14	25
51300005	Branch of Old Channel Chariton River – Mile 32	Macon	3	1.5	.4	26	0
51300006	Sand Creek	Macon	3	2.4	1.3	54	100
51300007	Ward Branch	Macon	3	2.1	0	0	0
51300008	Branch of Old Channel Chariton River – Mile 45	Macon	3	2.5	.8	34	0
51300009	Huckleberry Creek	Macon	3	1.6	0	0	0
51310000	Puzzle Creek	Chariton	4	15.9	6.3	40	100
5131000	Unnamed	Chariton	3	.8	0	0	0
51312000	Unnamed	Chariton	3	.7	0	0	0
51330000	Painter Creek	Macon	3	4.9	1.8	35	100
51340000	Elam Creek	Macon	3	1.3	0	0	0
51350000	White Oak Creek	Macon	3	3.5	0	0	0
51360000	Little Turkey Creek	Macon	3	3.2	2.5	78	100
51370000	Turkey Creek	Macon	4	7.1	3.4	48	100
51371000	Unnamed	Macon	3	3.1	.8	26	43
51380000	Rock Creek	Macon	3	6.5	0	0	0
51410000	Walnut Creek	Macon	5	16.9	8.7	52	100
51411000	Little Walnut Creek	Macon	4	4.5	2.5	56	41
51411100	Unnamed	Macon	3	2.8	.7	23	0
51411200	Unnamed	Macon	3	2.2	.6	25	0
51412000	Little Walnut Creek	Macon	3	6.0	1.5	24	0
51413000	Unnamed	Macon	3	2.9	0	0	0
51420000	Sand Creek	Macon	4	4.9	0	0	100
51421000	Unnamed	Macon	3	2.2	0	0	0
51430000	Cottonwood Creek	Macon	3	6.3	2.6	42	0
51440000	Sugar Creek	Adair	4	7.6	0	0	100
51441000	Unnamed	Adair	3	.6	0	0	0
51442000	Turkey Run	Adair	3	2.6	0	0	0
51460000	Goose Creek	Adair	3	4.6	3.9	85	0

Appendix A1 continued

51470000	Hog Creek	Adair	3	16.7	6.3	38	100
51480000	Billy's Creek	Adair	3	14.7	7.8	53	100
51510000	Big Creek	Adair	4	3.6	3.4	94	100
51520000	Dave Branch	Adair	3	2.6	1.1	42	100
51530000	Spring Creek	Adair	4	24.6	14.5	59	100
51531000	Jobs Creek	Adair	3	.7	0	0	0
51532000	Dry Branch	Sullivan	3	1.8	.9	46	100
51533000	North Spring Creek	Sullivan	3	8.8	.4	3	100
51540000	Rye Creek	Adair	3	1.8	1.8	99	100
51550000	Shuteye Creek	Adair	3	13.6	11.1	82	100
51560000	Hazel Creek	Adair	4	8.1	5.5	67	100
51561000	Little Hazel Creek	Adair	3	3.3	1.5	47	0
51570000	Blackbird Creek	Adair	5	25.9	19.7	76	100
51571000	South Blackbird Creek	Putnam	4	22.2	14.5	66	100
51571100	Kinny Creek	Putnam	3	4.0	.7	18	100
51571200	Unnamed	Putnam	3	1.9	.2	10	0
51573000	Lick Creek	Putnam	3	.82	.8	100	100
51574000	Unnamed	Putnam	3	.8	0	0	0
51575000	Unnamed	Putnam	3	.7	.7	100	0
51580000	Wildcat Creek	Putnam	3	7.3	5.9	82	100
51610000	Lost Creek	Schuyler	3	3.3	1.9	57	36
51620000	Sand Creek	Schuyler	3	2.3	2.1	89	100
51640000	Elm Creek	Schuyler	5	9.1	4.8	52	100
51641000	Winkler	Schuyler	4	5.0	2.1	41	100
51641100	Unnamed	Schuyler	3	1.4	0	0	0
51650000	Shoal Creek	Putnam	5	59.8	16.8	28	100
51651000	Brush Creek	Putnam	3	5.1	2.6	51	100
51652000	Sandy Creek	Putnam	4	6.8	4.4	64	100
51652100	Little Sandy Creek	Putnam	3	.9	.9	100	100
51653000	Unnamed	Putnam	4	11.5	2.3	20	53
51653100	Unnamed	Putnam	3	4.0	1.7	43	44
51653110	South Creek	Putnam	3	.9	0	0	48
51653200	Unnamed	Appanoose	3	3.3	.7	31	0
51654000	Unnamed	Appanoose	3	1.4	1.0	76	100
51655000	Unnamed	Appanoose	3	.2	0	0	0

Appendix A1 continued

51656000	Unnamed	Appanoose	3	1.3	1.1	82	0
51657000	Unnamed	Appanoose	3	.5	0	0	0
51670000	Turkey Creek	Putnam	3	6.4	.5	7	0
Stream Code	Stream Name	County	Order	Miles Total	Miles Chan	% Chan	% Perm Flow
51671000	Unnamed	Putnam	3	.9	0	0	0
51511000	Unnamed	Adair	3	1.3	.35	27	100

Appendix A2 – General Location

Stream Code	Stream Name	County	Sec	Township	Range	Gradient (feet/mile) (Mean & By Order)
LITTLE CHARITON RIVER SUBBASIN						
80000000	Old Channel Chariton	Chariton	06	51	17	NM
51110000	Young Creek	Chariton	03	52	18	15.8
46580000	Little Chariton River	Chariton	08	51	17	2.8
46581100	Doxies Creek	Chariton	32	52	17	7.0 ⁴ 5.6 ³ 15.0
46581110	Batts Creek	Chariton	21	52	17	10.3 ⁴ 9.7 ³ 46.1
*46581111	Unnamed	Chariton	22	52	17	NM
*46581112	North Fork Batts Creek	Chariton	19	52	17	8.1
46581120	Doxies Fork	Howard	06	51	17	NM
46581200	Unnamed	Chariton	07	52	17	NM
46582000	Middle Fork Little Chariton	Chariton	05	52	17	2.5 ⁵ 2.9 ⁴ 2.0 ³ 4.2
46582120	Lake Branch	Chariton	11	53	17	12.5
46582130	Muncas Creek	Chariton	06	53	16	5.9
46582140	Bee Creek	Chariton	31	54	16	15.6
46582150	Unnamed	Randolph	02	54	16	NM
*46582210	Unnamed (Brush Creek Tributary)	Randolph	08	55	15	NM
46582230	North Fork Claybank Creek	Macon	20	56	15	8.9 ⁴ 6.1 ³ 11.8
*46582231	Tributary of North Fork Claybank Creek	Macon	4	56	15	NM
*46582300	Stinking Creek	Macon	24	56	16	7.2
46582410	Unnamed	Macon	06	56	15	NM

Appendix A2 continued

46582420	Sweezer Creek	Macon	4	57	15	3.2
46582430	Town Creek	Macon	34	58	15	NM
*46582440	Unnamed	Macon	15	58	15	NM
46583000	East Fork Little Chariton River	Chariton	05	52	17	^{2.9} ⁵ 1.0 ⁴ 3.3 ³ 8.0
99999991	Unnamed	Chariton	04	52	17	NM
46583110	Barber Branch	Howard	02	52	17	12.9
46583120	Mott Creek	Chariton	30	53	16	9 ⁴ NM ³ 9.6
*46583121	Tributary of Mott Creek	Chariton	32	53	16	NM
46583130	Silver Creek	Chariton	21	53	16	8.3 ⁴ 6.5 ³ 12.2
*46583131	Tributary of Silver Creek	Randolph	26	53	16	17.7
*46583132	Bagby Branch	Randolph	36	53	16	10.5
*46583133	Turner Fork	Randolph	28	53	15	13.5
99999992	Unnamed	Randolph	10	53	16	NM
46583140	Sweet Spring Creek	Randolph	12	53	16	6.9 ⁴ 6.7 ³ 10
*46583141	Tributary of Sweet Springs	Randolph	16	53	15	NM
*46583142	Collier Branch	Randolph	02	53	15	8.6
*46583143	Trib. of Sweet Springs	Randolph	18	53	14	7.8
*46583144	Trib. of Sweet Springs	Randolph	10	53	14	NM
46583150	Dark Creek	Randolph	31	54	15	7.3
46583160	Sugar Creek	Randolph	23	54	15	10.4 ⁴ 10.4 ³ NM
*46583161	Tributary of Sugar Creek	Randolph	30	54	14	8.2
46583170	Sinking Creek	Randolph	24	54	14	6.6
46583210	Walnut Creek	Randolph	36	55	15	6.6
*46583211	East Fork Walnut	Randolph	20	55	14	8.7
*46583212	North Fork Walnut	Randolph	20	55	14	15.6
99999993	Unnamed	Randolph	36	55	15	20
46583220	Unnamed	Randolph	18	55	14	15.4
46583230	Unnamed	Macon	31	56	14	24.6
46583240	Unnamed	Macon	29	57	14	10.9
46583250	Duck Creek	Macon	19	57	14	22.9
46583260	Long Branch	Macon	31	58	14	2.9 ⁴ 3.8 ³ 1.6
*46583261	Tributary to Long Branch	Adair	31	61	14	NM

Appendix A2 continued

46583270	Lick Creek	Macon	36	59	15	3.5
46583280	Richland Creek	Macon	01	59	15	2.8
46583290	Tributary of East Fork Little Chariton	Adair	15	61	15	NM
MUSSEL FORK SUBBASIN						
51130000	Mussel Fork Creek	Chariton	15	53	18	3.7 ⁵ 3.7 ⁴ NM ³ 6.4
51131100	Unnamed	Chariton	5	53	18	NM
51131200	Unnamed	Chariton	31	54	18	NM
51131300	Long Branch	Chariton	17	54	18	6.2 ⁴ 4.7 ³ 3.9
51131310	Unnamed	Chariton	6	54	18	NM
51131320	Skunk Creek	Chariton	6	54	18	7.9
51131330	Hurricane Creek	Chariton	18	55	18	NM
51131400	Cottonwood Creek	Chariton	9	54	18	8.4
51131500	Clarks Creek	Chariton	29	55	18	6.2 ⁴ 4.1 ³ 6.6
51131510	Unnamed	Chariton	20	55	18	NM
51131520	Locust Branch	Chariton	29	56	18	7.3
51131600	Unnamed	Chariton	11	55	18	NM
51131700	Van Dorsen	Chariton	23	56	18	NM
51131800	Unnamed	Chariton	24	56	18	10.3
51132100	Brush Creek	Chariton	13	56	18	8.1
51132400	Unnamed	Macon	6	59	17	NM
51132500	Badger Creek	Macon	6	59	17	8.3
51132600	Little Mussel	Adair	31	61	17	12.8
51132700	Unnamed	Sullivan	23	62	18	NM
51132800	Unnamed	Sullivan	2	62	18	NM
CHARITON RIVER MAIN STEM SUBBASIN						
51200000	Chariton River	Chariton	15	53	18	2.1 ⁶ 2.2 ⁵ NM ⁴ 2.7 ³ 3.1
51200001	Unnamed	Chariton	1	53	18	6.5
51200002	Unnamed	Chariton	18	54	17	6.6
51200003	Unnamed	Chariton	4	54	17	8.2
51210000	Puzzle Creek	Chariton	11	53	18	5.8 ⁴ NM ³ 7.4
51211000	Unnamed	Chariton	12	53	18	18.7
51220000	Long Creek	Chariton	2	53	18	3.3
51230000	Jones Branch	Chariton	7	54	17	10.3 ⁴ NM ³ 12.3

Appendix A2 continued

51231000	Unnamed	Chariton	31	55	17	16.7
51240000	Bee Branch	Chariton	4	54	17	8.3 ⁴ 2.0 ³ 12.2
51241000	Unnamed	Chariton	28	55	17	9.8
51242000	East Bee Branch	Chariton	10	55	17	12.7
51270000	Elm Branch	Chariton	13	55	17	6.4
51280000	Kelly Branch	Chariton	8	55	16	3.6
51300004	Old Channel Chariton River	Macon	3	59	16	2.2 ⁴ 2.5 ³ NM
51300005	Branch of Old Channel Chariton River – Mile 32	Macon	32	58	16	13.4
51300006	Sand Creek	Macon	9	57	16	21.1
51300007	Ward Branch	Macon	15	58	16	19.4
51300008	Branch of Old Channel Chariton River – Mile 45	Macon	33	59	16	8.1
51300009	Huckleberry Creek	Macon	11	59	16	18.9
51310000	Puzzle Creek	Chariton	31	56	16	6.3 ⁴ 4.2 ³ 12.1
5131000	Unnamed	Chariton	19	56	16	12.8
51312000	Unnamed	Chariton	25	57	17	NM
51330000	Painter Creek	Macon	17	58	16	6.7
51340000	Elam Creek	Macon	27	58	16	22.4
51350000	White Oak Creek	Macon	8	58	16	NM
51360000	Little Turkey Creek	Macon	33	57	16	12.5
51370000	Turkey Creek	Macon	28	59	16	15.4 ⁴ 4.2 ³ 19.1
51371000	Unnamed	Macon	17	59	16	15.9
51380000	Rock Creek	Macon	23	59	16	3.1
51410000	Walnut Creek	Macon	34	60	16	8.2 ⁵ 2.0 ⁴ 10.4 ³ 14.6
51411000	Little Walnut Creek	Macon	18	60	16	8.9 ⁴ 7.7 ³ 17.2
51411100	Unnamed	Macon	14	60	17	13.9
51411200	Unnamed	Macon	14	60	17	18
51412000	Little Walnut Creek	Macon	31	61	16	11.6
51413000	Unnamed	Macon	35	62	17	16.7
51420000	Sand Creek	Macon	35	60	16	12.1 ⁴ 7.6 ³ 17.4
51421000	Unnamed	Macon	36	60	16	13.6
51430000	Cottonwood Creek	Macon	26	60	16	12.7

Appendix A2 continued

51440000	Sugar Creek	Adair	16	61	16	10.5 ⁴ 9.9 ³ 13.1
51441000	Unnamed	Adair	14	61	16	31.3
51442000	Turkey Run	Adair	18	61	15	15.3
51460000	Goose Creek	Adair	5	61	16	19.8
51470000	Hog Creek	Adair	4	61	16	11.4
51480000	Billy's Creek	Adair	21	62	16	11.5
51510000	Big Creek	Adair	15	62	16	17.6 ⁴ 12.7 ³ 21.2
51520000	Dave Branch	Adair	16	62	16	15.9
51530000	Spring Creek	Adair	33	63	16	7.8 ⁴ 4.9 ³ 4.0
51531000	Jobs Creek	Adair	25	63	17	30.7
51532000	Dry Branch	Sullivan	7	64	18	21.7
51533000	North Spring Creek	Sullivan	27	64	18	11.3
51540000	Rye Creek	Adair	22	63	16	16.4
51550000	Shuteye Creek	Adair	9	63	16	10.3
51560000	Hazel Creek	Adair	3	63	16	9.8 ⁴ 4.1 ³ 12.4
51561000	Little Hazel Creek	Adair	36	64	16	12.3
51570000	Blackbird Creek	Adair	3	63	16	7.3 ⁵ 2.7 ⁴ 1.4 ³ 12.2
51571000	South Blackbird Creek	Putnam	2	64	17	6.3 ⁴ 5.5 ³ 8.9
51571100	Kinny Creek	Putnam	22	65	18	15
51571200	Unnamed	Putnam	13	65	19	10.2
51573000	Lick Creek	Putnam	21	65	17	15.2
51574000	Unnamed	Putnam	28	66	18	NM
51575000	Unnamed	Putnam	19	66	18	30.3
51580000	Wildcat Creek	Putnam	16	64	16	13.7
51610000	Lost Creek	Schuyler	10	64	16	18
51620000	Sand Creek	Schuyler	34	65	16	8.6
51640000	Elm Creek	Schuyler	22	65	16	8.8 ⁵ 5.0 ⁴ 9.1 ³ 6.9
51641000	Winkler	Schuyler	11	65	16	16
51641100	Unnamed	Schuyler	12	65	16	14.1
51650000	Shoal Creek	Putnam	4	65	16	4.0 ⁵ 2.3 ⁴ 4.5 ³ 12.9
51651000	Brush Creek	Putnam	31	66	16	15.7
51652000	Sandy Creek	Putnam	31	66	17	12.3 ⁴ NM ³ 13.4
51652100	Little Sandy Creek	Putnam	28	66	17	21.5

Appendix A2 continued

51653000	Unnamed	Putnam	34	67	18	7.0 ⁴ 4.8 ³ 8.2
51653100	Unnamed	Putnam	5	66	18	5.0 ⁴ NM ³ 6.9
51653110	South Creek	Putnam	16	67	18	NM
51653200	Unnamed	Appanoose	16	67	18	18.2
51654000	Unnamed	Appanoose	19	67	17	14.6
51655000	Unnamed	Appanoose	6	67	17	NM
51656000	Unnamed	Appanoose	36	68	18	15.5
51657000	Unnamed	Appanoose	26	68	19	NM
51670000	Turkey Creek	Putnam	5	66	16	12.4
Stream Code	Stream Name	County	Sec	Town-ship	Range	Gradient (feet/mile) (Mean & By Order)
51671000	Unnamed	Putnam	6	66	16	0
51511000	Unnamed	Adair	7	62	15	15.3